

## WAX AND CANDLE COMPOSITIONS

### Background of the Invention

This invention generally relates to the dispensing of volatile material, e.g. a  
5 fragrance, from a candle product. More specifically this invention relates to a free-  
standing candle comprising an outer, volatile material containing shell, an inner core  
and wick.

A typical candle is formed of a solid, or semi-solid, body of wax such as paraffin  
10 wax or beeswax that contains an axially embedded combustible wick. When the  
wick of the candle is lit the heat that is generated melts the solid wax. The resulting  
liquid wax rises up the wick through capillary action and is combusted. More  
recently transparent and translucent candles have been developed in which the body  
of the candle comprises a solvent blended with a polymeric material to form a gel.  
15 For example United States Patent number 6,111,055 describes a gel candle  
composition comprising an ester-terminated dimer acid-based polyamide blended  
with a solvent. In this case the heat generated when the wick is lit is sufficient to  
melt the gel composition, and the resulting liquid is transported to the top of the wick  
by capillary action and is combusted.

20 Depending on the composition, the candle may be formed into a free-standing pillar,  
or may be better suited to being placed in a container.

Candles have also been developed that incorporate a perfume base in the wax or gel  
25 body. As the wax is melted in a lighted candle, there is a release of fragrance from  
the molten wax pool. Furthermore, the incorporated fragrance can slowly evaporate  
from the surface of the solid wax body of an unlit candle, thereby providing a low  
level of fragrance to the surrounding atmosphere.

30 Conventional fragrance candles have drawbacks because of cost and other  
considerations. Much of the fragrance incorporated into a conventional fragrance  
candle is drawn up the wick and combusted during candle burning, leaving only a

candle is drawn up the wick and combusted during candle burning, leaving only a relatively small amount of fragrance to evaporate from the molten wax pool and to freshen the surrounding atmosphere. Further, the migration of incorporated fragrance through the solid wax body of an unlit candle is relatively slow and the level of fragrance released is lower than desired. Increasing the amount of fragrance incorporated into the candle to a level sufficient to freshen the surrounding atmosphere makes the candle tacky or oily and deprives the candle of sufficient structural properties to enable it to resist damage and stand freely. Conventional fragrance candles are generally therefore protected and supported by a rigid, non-flammable container, typically made of for example glass or ceramic.

US Patent No. 4,568,270 describes a fragranced free standing candle which comprises an inner fragranced core comprising from 5 to 12% by weight of fragrance oil and an outer shell comprising a high melting paraffin/wax mixture. The outer core may also be fragranced and the examples, e.g. examples 16 to 30 suggest that the amount of fragrance oil in the outer shell may be from 5 to 12% by weight. However, such candles still suffer from the disadvantage that approximately 50% by weight of the fragrance oil is still present in the inner core and this may be lost by, e.g. combustion.

Furthermore, attempts to incorporate a high fragrance loading into a wax candle may have a deleterious effect on the burn performance of the candle.

There is therefore continuing interest in the development of improved fragrance and other types of candle products, for example, insecticidal candles, deodorising candles and antibacterial candles, which overcome or mitigate the disadvantages of prior art candles.

#### **Description of the Invention**

It is an object of this invention to remedy the problems of conventional candles outlined above. In particular an object of the invention is to provide a free-standing

wax air freshener and/or a free standing air freshener candle product, or other such candle products comprising a volatile material, which releases a suitable level of the volatile material into the atmosphere when unlit, and that will release an increased level of the volatile material to the atmosphere when lit.

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It is another object of this invention to provide a candle comprising a wax-like composition which has a surprisingly high content of volatile material.

Other objects and advantages of the present invention shall become apparent from the  
10 accompanying descriptions and drawings.

According to a first aspect of the invention we provide a candle comprising at least two distinct phases characterised in that at least one of the phases comprises from 0.0001 % w/w to 99 % w/w of an active volatile material.

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In certain embodiments the phases of the candle may comprise, for example, first and second layers. Although it will be understood that a candle of the invention may comprise more than two layers. In an alternative aspect of the inventions the phases or layers may comprise a core, e.g. a cylindrical core and an outer shell. However,  
20 again it will be understood that each of the core and outer shell may themselves comprise a plurality of layers.

The candle of the invention may comprise at least 5% w/w of an active volatile material, preferably 10% w/w of an active volatile material and especially at least  
25 15% w/w and less than 99.99% of an active volatile material.

A candle according to claim 1 characterised in that the active volatile material is selected from an insecticide, an insect repellent, an insect attractant, a fragrance, a deodorising agent and an anti-bacterial agent, or any combination thereof.  
30 Alternatively, the active volatile material is selected from an insecticide, an insect repellent, a deodorant and an anti-bacterial agent, or any combination thereof. In a

particular embodiment of the invention the active volatile material may be a fragrance.

5 In a preferred aspect of the invention, at least one of the phases of the candle may comprise from 1 % w/w to 99 % w/w of an active volatile material, preferably from 12 % w/w to 99 % w/w of an active volatile material, more preferably from 15% to 99% w/w of an active volatile material and especially from 20 % w/w to 70% w/w of an active volatile material.

10 In a preferred aspect of the invention the wax air freshener may be in the form of a candle. Thus, according to a further aspect of the invention we provide a free-standing fragranced candle comprising a wax incorporating a perfume base and a wick characterised in that the fragrance content of the wax is greater than 15% by weight.

15 In a further embodiment the candle of the invention may comprise an outer shell and an inner core. Thus, for example the candle may comprise an outer shell with a fragrance content of greater than 15%. The inner core may comprise a fragrance content the same as or preferentially lower than that of the outer shell.

20 In accordance with this aspect of the invention we provide a free-standing fragranced candle comprising an outer shell incorporating a perfume base, an inner core and a wick characterised in that the fragrance content of the outer shell is greater than 15% by weight.

25 In a preferred embodiment of the invention the candle as hereinbefore described comprises an outer shell characterised in that the perfume base content of the outer shell is from 15 to 70% by weight.

In a further preferred embodiment of the invention the candle may comprise an outer shell having a higher melting point than the inner core. The outer shell as hereinbefore described may include a layer over the top of the candle.

5 The outer shell may be continuous or discontinuous and / or the outer shell may cover all or part of the faces/sides/surfaces of the core.

In the candle of the invention at least one of the phases may act as a bonding, sealing, separating, barrier, supporting or coating agent or a combination thereof on the other phase.

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Alternatively, at least one of the phases may comprise a non-melting wax, stone, metal, plastic, or ceramic or a mixture thereof and from 0.0001 % w/w to 99 % w/w of an active volatile material selected from an insecticide, insect repellent, insect attractant, a fragrance, deodorising or anti-bacterial agent.

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At least one of the phases may comprise a glass and from 7 % w/w to 99 % w/w of an active volatile material whereby the active volatile material is a fragrance or from 0.0001 % w/w to 99 % w/w of an active volatile material whereby the active volatile material is selected from an insecticide, insect repellent, insect attractant, deodorising or anti-bacterial agent

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Alternatively, at least one of the phases may comprise any combination from a glass and from 7 % w/w to 99 % w/w of an active volatile material whereby the active volatile material is a fragrance or from 0.0001 % w/w to 99 % w/w of an active volatile material whereby the active volatile material is selected from an insecticide, insect repellent, insect attractant, deodorising or anti-bacterial agent and a non-melting wax, stone, metal, plastic, or ceramic or a mixture thereof and from 0.0001 % w/w to 99 % w/w of an active volatile material selected from an insecticide, insect repellent, insect attractant, a fragrance, deodorising or anti-bacterial agent.

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In an alternative aspect of the invention we provide a candle which is a free-standing candle or a candle in an open or closed container.

When the candle comprises layers, it may be such that, in normal use at least one of the phases is horizontally oriented. Alternatively, at least one of the phases may be vertically oriented.

The phases have different melting rates.

10 In a further aspect of the invention we provide a device comprising a candle as hereinbefore described wherein the device is adapted to be used as an air freshener, insecticide, insect repellent, insect attractant, deodorising and/or anti-bacterial device characterised in that it does not comprise a candle wick.

15 Alternatively, the device may comprise an air freshener, insect or pest control product, odour neutraliser, deodoriser or anti-bacterial device.

In a further embodiment one phase of the candle may comprise a liquid at room temperature. Alternatively, at least one phase of the candle may comprise a liquid fuel.

20 The inner core is formed of a solid body of wax, such as paraffin wax or beeswax. Optionally the inner core may contain up to 10 weight percent of a perfume base. The inner core may be coated with between about 0.2-4.0mm of a fragranced outer shell.

25 Preferably, the fragranced outer shell may contain between about 30-70 weight percent of a perfume base and a carrier therefor, and is not tacky or oily at ambient temperature more preferably 40 to 60% by weight.

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The unusually high concentration of perfume base in the outer shell is sufficient to ensure a suitable release of fragrance to the surrounding atmosphere when the candle is unlit. Further, concentrating the perfume base in the thin outer shell facilitates migration to the surface of the candle body. When the wick of the candle is lit the heat generated is sufficient to melt the inner core, forming a molten pool within the shell. If perfume base is incorporated in to the inner core then some will evaporate from the molten pool to freshen the surrounding atmosphere, though much will be drawn up the wick and combusted as previously described. The perfume base incorporated in the outer shell is distant from the wick and is therefore less likely to be combusted. The heat generated by the flame and heat transfer from the molten pool is sufficient to warm the outer shell and enhance evaporation of perfume base therefrom, thereby providing a significant release of fragrance to the surrounding atmosphere.

Candles of this aspect of the invention, comprising an inner core and an outer fragranced shell are especially advantageous in that, *inter alia*, they provide a candle which possess a significantly improved burn performance.

The shell is preferably formed from a mixture comprising (a) between about 30-70 weight percent of a perfume base, (b) between about 20-70 weight percent of a linear alpha olefin and (c) optionally up to 50 weight percent of a suitable solvent. More preferably the shell comprises between about 40-60 weight percent of a linear alpha olefin and between about 40-60 weight percent of a perfume base.

However, in a further alternative a second outer shell may be included in the candle wherein the second outer shell comprises an unfragranced or fragranced layer. Thus, the candle may comprise, for example, an inner unfragranced core, a highly fragranced intermediate layer and then a further unfragranced outer layer. Such a candle is advantageous in that the fragrance is only released when the wax melts.

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The shell may be made up a multitude/plurality of layers each of which are fragranced or unfragranced.

In a yet further alternative the inner core may be perfume free. Such a perfume free inner core candle may be advantageous in that it will have a superior burn performance over a perfumed core candle, especially when this contains a high dosage of fragrance. This would make the candle as well cheaper without sacrificing fragranc

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In a further embodiment of the invention the inner core and/or the outer shell of the candle may comprise a transparent material, such as those described in:

- a) US Patent No. 6,268,466 to Arizona Chemical which relates to amide terminated polyamides.
- b) US Patents Nos. 6,111,055, 5,998,570 and 5,783,657 to Union Camp which describe ester terminated polyamide.

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In such a candle any conventionally known transparent materials or combinations thereof or with wax may be used.

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According to a further aspect of the invention we provide a process for the preparation of a candle as hereinbefore described characterised in that the process comprises a method selected from one or more of moulding, dipping, compressing, extruding and the like.

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The process of the invention may also comprise coating a conventional candle.

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In an especially preferred aspect of the invention the core may be coated in a paraffin wax, e.g. by dipping, before being coated with the outer layer. Such a method of manufacturing is especially advantageous in that the use of a paraffin wax intermediate layer creates an improved bond between the core and the outer layer. Thus, such candles are novel *per se* and therefore according to a yet further aspect of the invention we provide a candle comprising at least one core and at least one outer



shell as hereinbefore described and including an intermediate layer, e.g. an intermediate paraffin wax layer.

In a yet further alternative the fragrance may be encapsulated inside the wax.

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According to a yet further aspect of the invention we provide a candle lantern comprising a candle as hereinbefore described.

The waxes of the invention may be suitable for use as, *inter alia*, conventional air fresheners. However, one or more conventionally known insecticide materials may be included in the wax formulation (both in the shell or / and in the core). Thus such wax formulations may be suitable for use as an insecticide/deodoriser.

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#### Brief Description of the Drawings

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A better understanding of the objects, features and advantages of the present invention can be gained from the following detailed description of the preferred embodiments in conjunction with the appended drawings, wherein:

FIG. 1 is a plan view of an embodiment of a fragranced candle according to the invention;

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FIG. 2 is a cross-sectional view taken along the line 1-1 of FIG. 1;

FIG. 3 is a plan view of a further embodiment of a fragranced candle according to the invention;

FIG. 4 is a cross-sectional view taken along the line 2-2 of FIG. 3;

FIG. 5 is a cross-sectional plan view of a multilayered candle of the invention;

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FIG. 6 is a vertical cross-section of a candle of FIG. 5;

FIG. 7 is a cross-sectional plan view of a square multilayered candle of the invention;

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FIG. 8 is a vertical cross-section of a candle of FIG. 7;

FIG. 9 is a vertical cross-section of a candle of the invention comprising multilayers at one end;

FIG. 10 is a cross-sectional plan view of a shell candle comprising a plurality of discontinuous layers;

FIG. 11 is a vertical cross-section of a shell candle comprising a plurality of discontinuous layers;

5 FIG. 12 is a cross-sectional plan view of a shell candle comprising a plurality of discontinuous layers;

FIG. 13 is a vertical cross-section of a shell candle comprising a plurality of discontinuous layers; and

10 FIG. 14 is a vertical cross-section of a shell candle comprising a plurality of discontinuous multilayers at one end.

### **Preferred Embodiments of the Invention**

FIGS. 1 and 2 show a free-standing fragrance candle 10 according to the invention.  
15 The candle 10 comprises a wick 11, an inner core 12, and an outer shell 13.

The core 12 can be produced by employing conventional candle making methods such as moulding, dipping, compressing, extruding and the like. The core 12 is formed of a material selected from the group consisting essentially of paraffin, paraffin wax, beeswax, montan wax, carnauba wax, microcrystalline wax, fatty  
20 alcohols, fatty acids, fatty esters, natural and synthetic resins, and mixtures thereof. Optionally, but not necessarily, the core 12 can also contain perfume base.

The shell 13 is preferably formed from a mixture comprising (a) between about 30-70 weight percent of a perfume base, (b) between about 20-70 weight percent of a linear alpha olefin and (c) optionally up to 50 weight percent of a suitable solvent. More preferably the shell 13 comprises between about 40-60 weight percent of a linear alpha olefin and between about 40-60 weight percent of a perfume base.

30 Among the different qualities of linear alpha olefins available, particularly good results have been obtained by using LAO C30+ (available from Aiglon S.A.).

As a perfume base there is used in the shell 13, and optionally in the core 12, any of the compositions currently used in perfumery. These can be discreet chemicals, more often however they are mixtures of volatile liquid and/or solid ingredients of natural or synthetic origin. The nature of these ingredients can be found in specialised books of perfumery, e.g. in S. Artander (Perfume and Flavor Chemicals, Montclair N.J., USA 1969). Suitable perfume bases are available commercially from a number of fragrance suppliers.

Optionally the shell 13 can be formed from a mixture of a perfume base and materials selected from the group consisting of paraffin, paraffin wax, beeswax, montan wax, carnauba wax, microcrystalline wax, fatty alcohols, fatty acids, fatty esters, natural and synthetic resins, and mixtures thereof. In such instances the maximum amount of perfume base incorporated in the shell is limited to approximately 50 weight percent, as inclusion levels above this amount make the candle tacky or oily and generally disagreeable to the touch.

A fragrance candle according to the present invention preferably comprises a number of additional features. Thus while a plurality of wicks each equidistant from the candle axis can be employed, it is usual for there to be a single wick 11 which extends along the candle axis.

The candle 10 can have any shape that a conventional pillar candle can have. In FIGS. 1 and 2 the core 12 and shell 13 are cylindrical.

In FIGS. 3 and 4 the core 22 and shell 23 are square in a cross section taken in a plane normal to the wick 21.

#### **Example 1**

A core was formed using a commercially available unfragranced cylindrical pillar candle with a single wick extending along the candle axis. The core had a diameter

of approximately 50mm, a height of approximately 105mm and a total mass of 172.3g.

5 A shell composition was prepared by heating 150.0g of a perfume base (lavender scent) and 100.0g of LAO C30+ (available from Aiglon S.A.) in a sealed 500ml glass powder jar to 90°C in a water bath, whereupon the linear alpha olefin dissolved in the perfume base. The mixture was agitated until completely homogeneous and then cooled to 75°C.

10 The core was dipped into the molten shell composition, removed and allowed to cool. This dipping and cooling process was repeated until the total mass of the candle had increased to 189.0g. The shell thus had a total mass of about 16.7g, a thickness of about 1mm and contained approximately 10.0g of the perfume base.

15 The free standing pillar candle thus produced was not tacky or oily, and provided a suitable amount of fragrance to freshen the surrounding air when unlit.

20 Once lit the fragranced shell, being more distant from the candle flame melted more slowly than the core and formed a rim, which retained the molten pool formed as the candle burned. The shell surrounding the molten pool was warmed to a temperature above ambient, facilitating additional release of perfume base to the surrounding atmosphere.

### Example 2

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4.0g of a perfume base (lavender scent) was mixed with 196.0g of a molten commercially available paraffin wax blend, and 150.0g of the resulting mixture poured into a cylindrical candle mould and allowed to cool to ambient temperature. A fragranced core, with an axially embedded wick, was thus produced. The core had  
30 a diameter of approximately 43mm and a height of approximately 115mm.

A shell composition was prepared by heating 125.0g of a perfume base (lavender scent) and 125.0g of LAO C30+ (available from Aiglon S.A.) in a sealed 500ml glass powder jar to 90°C in a water bath, whereupon the linear alpha olefin dissolved in the perfume base. The mixture was agitated until completely homogeneous and then  
5 cooled to 75°C.

The core was dipped into the molten shell composition, removed and allowed to cool. This dipping and cooling process was repeated until the total mass of the candle had increased by 14.0g. The shell had a thickness of about 1mm and  
10 contained approximately 7.0g of the perfume base.

The free standing pillar candle thus produced was not tacky or oily, and provided a suitable amount of fragrance to freshen the surrounding air when unlit.

15 Once lit the fragranced shell, being more distant from the candle flame melted more slowly than the core and formed a rim, which retained the molten pool formed as the candle burned. The shell surrounding the molten pool was warmed to a temperature above ambient, facilitating additional release of perfume base to the surrounding atmosphere. Additional fragrance was released from the molten pool as in a  
20 conventional fragrance candle.

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